Montana's Flying Classroom

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Introduction . . .

"THE FLYING CLASSROOM"

Youth, water and soil are undoubtedly three of Montana's most valuable resources and their full development demands the best we have to give.

The following pages unfold the story of an educational endeavor that Montana chooses to call the "Flying Classroom." Its purpose is to acquaint future agriculturalists with the benefits of aviation when linked with agriculture and to demonstrate the effectiveness of using aircraft as a teaching tool.

The Flying Classroom program will have served its purpose if by provoking new ideas it will benefit Montana's youth, agriculture and aviation.

The concept of airborne classes is not new; in fact, as long ago as 1934 this quotation was heard on a radio program sponsored by the Bank of America: "The youth of tomorrow will get his economics and his geography from the cabin of an airplane flying ten thousand feet above the earth's surface and cruising at a speed of 500 mph. From this broad vantage point, you can not fail to be impressed by the unlimited natural wealth unrolling beneath your eyes in all its tremendous significance, in all its capacity to make a great nation self-sustaining. This is the gift of the airplane to humanity and the enlargement of man's sympathies, the greatening of his capacity to see big things in the big."

MONTANA'S PROGRAM

The initial planning of the Montana program began with the Supervisor of Aviation Education, The Montana Aeronautics Commission and the Supervisor of Agricultural Education, Department of Public Instruction, discussing broadly, then outlining in detail, the advantages and the disadvantages of such an ambitious undertaking as the Flying Classroom. The conclusion reached by the two State Departments was that the program had a definite educational value and that the airplane would be an unique and effective teaching aid for subjects dealing with the earth's surface, such as agriculture, geology, geography, forestry, conservation, history and economics.

To conform with vocational agriculture class study of all good farm practices in addition to soil, land and water conservation, the Flying Classroom would accent the link between aviation and agriculture. It would show the student that through the increased use of the airplane as an agricultural tool, aviation has become an extremely important economic benefit to farmers and ranchers.

In 1962 the Montana Aeronautics Commission initiated the Flying Classroom Project with the cooperation of the Department of Public Instruction with the first project being held at Malta High School. Twelve additional Montana High Schools have taken part in the program in the four ensuing years: Fort Benton, Red Lodge, Beaverhead, Flathead, Plentywood, Fergus, Custer, Huntley Project, Columbus, Lewistown, Broadus and Absarokee.

The Fort Benton High School has initiated an Earth Science Flying Classroom by which the students make an aerial study of the geological features of the area surrounding their community.

PRE-PROJECT PLANNING

The following requisites for an effective Flying Classroom were acknowledged and have been successfully executed on the Montana program.

Consent from parents and school authorities is imperative in the early planning stage of each school's project. They must be assured of the educational value of the Flying Classroom and that provisions for safety and adequate insurance protection have been accomplished. (Form Samples—See Appendix 1 & 2.)

The school's vocational-agriculture instructor should first of all be enthusiastic and willing to work. To him will fall the responsibility of coordination with school officials and the parents; the planning of the route with the local flight operator and the integrating of new content into his regular class instruction.

The student should learn of the economic ties between aviation and agriculture and how personal and business use of airplanes by farmers and ranchers contribute to a more efficient operation. A number of teachers have used Resource Speakers to present agricultural aviation, general aviation and flying. Resource Speakers may be obtained through the Aeronautics Commission, the Federal Aviation Agency and/or local flight operators.

PRE-FLIGHT PLANNING

Date and time of flight is of major importance. Consideration must be given to lack of snow cover, time of growing season, clear and comfortable flying weather and lack of competition with other school activities. Late April or May have been found to be the best times in Montana. Alternate dates for weather caused postponement should be made. Morning hours provide the smoothest flying conditions.

The instructor will need to plan the flight so that the distance between points is not too great; that a variety of agricultural and conservation features are included without a repetition of the same features over and over. A route list should be made available to each student prior to the flying classroom and discussed in class before the actual flight. The route lists are an aid for post-flight class discussion of the features observed and in evaluating the project. (Route List example—See Appendix 3)

The route to be flown and points to be observed are laid out by the class instructor and the local pilot assigned to the project. They will fly the route in advance of the flight to determine the amount of time needed. Routes should require a maximum of 1½ hours to complete. (Route Map example—See Appendix 4)

The students visit the local airports to get a first-hand view of the aircraft and their maintenance. As this will be the first airplane ride for the majority of students, instruction is given on the simple fundamentals of the airplane, its operation, maintenance and "why" it flies.

PILOT/AIRCRAFT REQUIREMENTS

Pilots must hold commercial licenses and have extensive experience in the type of aircraft to be used. Pilots are approved by the Aeronautics Commission.

Aircraft must meet Federal Aviation Agency maintenance requirements for air taxi operation.

High-wing, high performance, four-to-six passenger planes of the Cessna 180 or Skywagon type have proven to be the most satisfactory as a portion of the flights are conducted over high altitude terrain and unobstructed observance of the ground below must be possible.

Each aircraft used must have minimum insurance coverage per passenger seat for Bodily Injury of $25,000. Most charter aircraft and state-owned aircraft used exceed this minimum by $75,000. Public Liability and Property Damage insurance should be adequate.

Aircraft must have good radio. In-flight commentary by the class instructor is conducted on 122.8 or 122.9 mc on the Unicom band.

FLIGHT CRITERIA

Turbulent air, poor visibility or marginal weather conditions are reasonable causes to postpone flight. Visibility should be at least 20 miles, ceiling should be at least 1,000 feet above the higher terrain with no precipitation.

Many students have a low tolerance for turbulence; anything exceeding light turbulence over the entire flight should be avoided.

No more than four aircraft fly at one time. This allows a diamond pattern flight with all planes over or near a check point at one time with no undue sacrifice of safety. Three planes, flying a pattern, usually are used. Planes should fly an extremely loose formation.

Sudden altitude changes requiring steep angles of ascent or descent should be avoided. Aircraft maneuvers should be kept gentle in order that first-time passengers are not startled or made to feel uneasy. Pilots should keep in mind that these are educational flights and that students are learning about aviation in addition to agriculture. They must be given a favorable impression.

FLIGHT TIME

Future agriculturalists of America prepare to depart on their Flying Classroom flight.

THE FLIGHT

The following pages contain photos and descriptions of features observed on an actual Montana Flying Classroom.

(Right) **Example: Diversity of farming methods**— block, strip, cropping and irrigation.

The narrow river bottoms are farmed intensively, both irrigated and dryland.

(Area shown near Park City on the Yellowstone River—looking west.)

(Left) **Example: Irrigation.**

A close-up view of an irrigated field. The different shades are produced by the direction of cultivation and the amount of growth.

(Left) **Example: Strip cropping.**

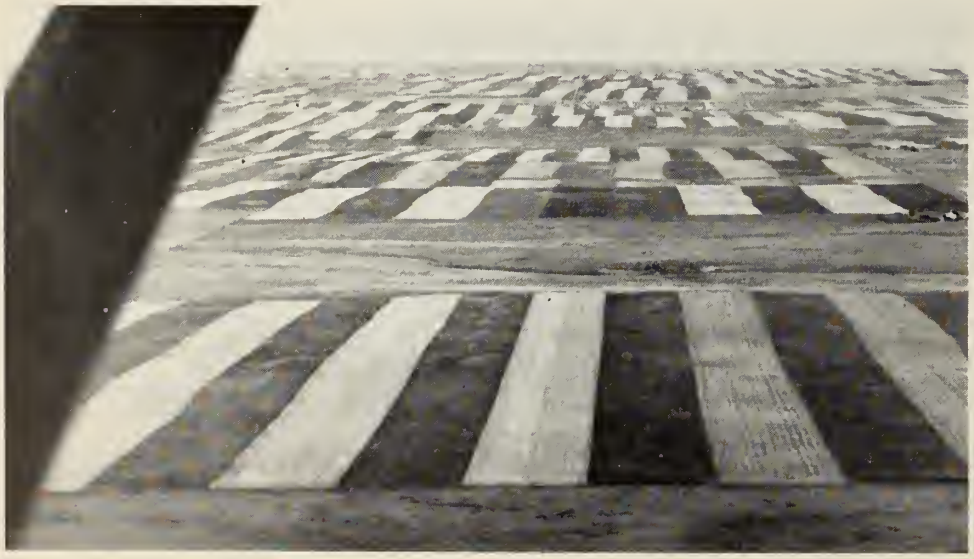
Cultivation on benchlands located between valleys.

The alternating of stubble strips with cultivated strips—this method is used in a variety of terrains.

(Right) **Example: Marginal farming**

Farming methods possible for rolling foothills terrain.

Contour strip cultivation can be used depending on the amount of slope.



(Left) **Example: Strip farming.**

To prevent excessive wind erosion, drainages and waterways are not cultivated. Strips are at right angles to the prevailing winds.

Photo depicts strip farming to an excellent advantage.

(Looking north in the Ryegate country.)

(Right) **Example: Farmstead arrangement.**

This building arrangement was noted.

The dark strip around the field at the left is the newly cultivated area.

(Left) **Example: Experimental Farm:**

Better farming through experimentation.

Recommended farm practices are reflected in the farmsteads and fields adjoining the Agricultural Experiment Station, Huntley Project.

The small rectangles in the foreground are the experimental plots.

(Right) **Example: Leveling.**

Leveling can produce good cropland where top soil is deep enough to warrant it.

Photo shows leveled land in the upper portion as contrasted with rolling land, in the lower portion.

(Right) **Maximum Land Use.**

Every foot of ground is being utilized to the best advantage for productivity in accordance with recognized good practices. Every area that is tillable is under cultivation, drainages and slopes are left. The strip of light spots in the center pasture is cattle feeding area.

(Left) **Example: Livestock production area.**

Photo denotes an area used for livestock production.

(Shown is the meandering East Rosebud River flowing out of the Absarokee Mountains.)

(Right) **Example: Livestock production area.**

These ridges are too high for cultivation, therefore, they are used for the grazing of sheep and cattle.

(Right) **Example: Livestock water source.**

This natural waterhole on a bench south of the Yellowstone River near Hysham dried up in the summer and cattle must drink from the stock dam, shown in the upper right.

(Left) **Example: Livestock water source.**

A constructed water hole for stock.

The sloping sides allow cattle to reach the water easily. The dam immediately beyond the water hole will retain the excess water during the periods of heavy run-off.

(Left) **Example: Irrigation sources.**

The snow melting in the high country provides water for irrigation downstream during the dry summer months.

(Photo of the Absarokee Mountains.)

(Right) **Example: Irrigation and border dikes.**

An excellent job of reclaiming land for production has been done here. The light wedge at the extreme right is alkali.

(The Yellowstone Valley near Custer.)

(Left) **Example: Good highway planning.**

New highway construction can be planned so that the valuable irrigated land is not removed from production. Highway shown borders badlands.

(Right) **Example: Irrigation methods.**

These waterspreading dikes help diffuse run-off and control irrigation water.

(Location is near Miles City.)

(Left) **Example: Stream bed erosion.**

Showing what extremely excessive rainfall and snow melt can do.

The dams have been washed out and new channels are being cut.

(North Sunday Creek near Miles City.)

(Left) **Example: Water conservation.**

Yellowtail Dam is located 45 miles southwest of Hardin. It is 520 feet high—1450 feet long. The reservoir is 71 miles long.

The cost, $39,809,359.00, and was constructed for power, irrigation, flood control, sedimentation control and recreation.

(Right) **Example: Erosion.**

One answer to the water erosion this severe is gully dam construction to retain water and stop the rapid runoff.

(Dam in photo hidden by wingstrut.)

(Right) **Example: Erosion.**

Milleniums of water and wind erosion have produced the badlands. Once under water, these weird formations show layers of clay, silt and other deposits.

(East of Miles City.)

(Left) **Example: Flood erosion.**

The river has overflowed its channel and cut into cropland producing severe erosion.

(Note the debris around the island in the Yellowstone River bed several days after high water has receded.)

(Left) **Example: Flood erosion prevention.**

In an area subject to much flooding year after year—local farmers have attempted to stop the river's cutting into cropland by installing jetties along the outside curve. The jetties are of log construction and cost approximately $500 per jetty.

(Location—on the Powder River.)

(Right) **Example: Flood erosion prevention.**

The same Powder River location looking downstream. The need can be seen for controlling the river channel. The diversion dam in the lower left has been washed through.

Seen center left: A dike is helping hold the river from flooding the fields and washing away valuable crop-producing lands.

Comments from instructors and students alike have provided an insight into the success of the Montana program.

"This project proved to be more valuable than we could have possibly imagined it to be while we were in the process of planning for it . . ."

—William W. Personen, Principal
Kalispell, Montana

"The participating students listed over forty different practices they had viewed. These items were mostly concerned with range management, soil and water management, and farm management.

Students commented that they had not fully realized . . . the different types of topography present before they took the flight.

"I would say the flight was a wonderful success . . ."

—David Melin, Instructor
Plentywood, Montana

"We all felt it offered a lot of education in a short length of time. So many things we spend hours describing were evident from the air in a few glances."

—Dean Pence, Instructor
Huntley Project

"This program is one of the finest examples of visual education that I have ever seen. Again, thanks for an excellent teaching-learning experience . . ."

—James M. Schultz, Instructor
Lewistown

"This trip, I think, was the most educational trip there could possibly be, not just because it was my first time in the air, but mainly because we were able to see all the types of land, erosion, irrigation, and the Yellowtail dam . . ."

—David Lindeen, Student

"I am sure this would be beneficial to other groups because I feel that I learned a lot from it. It gives a ranch boy a different view of things. It is a lot different looking down on our country rather than merely riding over it . . ."

—Don Muri, Student

"It is a pleasure to write this letter and truly thank you for a very educational and enjoyable flight around the farmlands of Miles City and vicinity. I was especially thrilled at the top-side look at strip farming and water spreading."

—Kelly Boucher, Student

Appendix 1

Date

To Parents of Vo-Ag Students:

Re: Agricultural-Aviation Education

Please find attached a form which has reference to your son's participation in the "Flying Classroom" to be conducted here on .....

If you are willing to have your boy participte in the flight, please return the signed form on ..... Your signature is absolutely necessary. Under no circumstances will the student be allowed to make the flight without the written consent of his parent or guardian. This form releases ..... High School from any liability. School insurance does not cover this activity. Every factor for the safety and well being of participants will be considered. All pilots involved are commercially rated and approved by the Montana Aeronautics Commission. The flight will be made during early morning hours to take advantage of the best air conditions. In the event of poor weather the flight will be postponed.

After take-off planes group themselves within one-fourth mile in diamond shaped pattern. The class instructor is in the lead plane and will make a running commentary on inter-plane radio as the flight progresses. Points of interest the students will observe are as follows: Strip Cropping—Contour Farming—Conservation Dams—Grassed Waterways—Water spreading devices—Shelter belts—Farm building arrangements—Drainage systems—Geological formations and soil building processes—Examples of wind erosion—Range reseeding projects—etc.

The flight is entirely voluntary in nature. The student who is not allowed to go will not suffer in his final grade. I do feel that this program is a privilege as well as a rare opportunity. I personally feel that both the vocational agriculture program and the students who participate will profit greatly.

If you have any questions feel free to contact me. If you want to have your son participate return the signed form by .....

Sincerely,

Vo-Ag Instructor

..... High School

Appendix 2

MONTANA AERONAUTICS COMMISSION
BOX 1698 — HELENA, MONTANA

PARENTS' RELEASE

We understand that our (son) (daughter) _____
Name

will participate in an airport field trip on _____
Date

at the _____ Airport. As a part of this field trip, opportunity will be given _____ Name to take an air ride with a duly licensed and qualified pilot in currently licensed aircraft.

We hereby signify our wishes concerning the above field trip and/or air ride, and so assume complete responsibility for our decision, releasing from responsibility _____ School District No. _____, the Department of Public Instruction, and Montana Aeronautics Commission, accompanying teachers and chaperons, and all others assisting in the planning and execution of the above stated field trip and/or air ride.

Airport Field Trip: We consent thereto and authorize _____
Name of Student
to participate in the field trip.

Date: _____. _____
(Parents' Signatures)

Air ride: We consent thereto and authorize _____ to take the air ride in
Name of Student
accordance with the above statement.

Date: _____. _____

_____
(Parents' Signatures)

Appendix 3

ROUTE LIST

ABSAROKEE VO-AG DEPARTMENT

ABSAROKEE HIGH SCHOOL

April 27, 1965

FLYING CLASSROOM PROJECT

For the next one hour and fifteen to twenty minutes we will have an opportunity to observe the largest share of Stillwater County. While in the air we fly at about 1,000 feet above the ground, and will have an excellent chance to see good farming practices along with some that need definite improvement. Observe all you can, take notes for later discussion on special points that we can further discuss in class. Remember to keep talking at a minimum and take notes.

Take a good look at the panels and interiors of your planes while making yourself comfortable. Fasten your seat belts so they're comfortable and watch the various panel gauges as you taxi down the runway; also observe the operation of the controls and gauges on the take-off.

1. **Columbus Water Users.** Just to the left of the runway the Columbus water users are building a drain ditch. This is being done to drain the area just east of Columbus of surface water. Due to the high amount of water, there is a lot of alkali showing up.
2. **Alfred Jensen's.** As we start up the Stillwater River, notice the difference in the dryland and irrigated places. From here to Absarokee and farther up you will be able to see excellent examples of contour ditches. The purpose of a ditch of this type is to prevent undue washing or erosion.
3. **Bob Lethert's.** Notice the building arrangement off to the right. On the left you will see contour strip farming.
4. **Cooney Dam.** Willow Creek and Red Lodge Creek water is stored here and used for irrigation when water in the Rock Creek gets low. It is also used for irrigaiton directly below the dam all the time.
5. **Absarokee.** The town site of Absarokee is off to the left. This is just a check point so that you can see where you are.
6. **Miller Bench.** This is directly behind the school. On the other side there has been some spring development work so that during dry years they won't have to haul water as they did four years ago.
7. **Traveling up the East Rosebud River,** if you look close towards Fishtail, you will be able to see some signs of over grazing. This is probably not too pronounced, but you can see the difference in the fence lines.
8. **Jake Ostrum's.** We are now in Carbon County going up Butcher Creek. On this place along the creek you can see a place where the hill has slipped, being caused by too much water run at one time.
9. **Pete MacKay's.** Off to the right you can see a dam put in about three years ago by Pete MacKay on Ingersoll Creek for stock water.
10. **Bill MacKay's.** Notice the building arrangement and the large hay meadows on this place. See if you can find areas where heavy grazing has taken place.
11. **East Rosebud Lake.** Up the river from Bill MacKay's lies the lake. Last year if you will remember, they had a forest fire which burned several thousand acres of timber and grass.
12. **Mystic Lake.** The air may be a little too rough to go up the canyon, but you will be able to see part of the dam and Montana Power Company Hydro-electric Plant. Most of the electricity that we use comes from here. Note the large siphon carrying water from the lake to the plant, 9,000 feet of pipe 56" in diameter, on Forest Service land, operated under special use permit.

13. **Benbow Mine.** This is the first of the chrome mines in the area. It was operating during the second world war and actually has a higher chrome content than the Mouat Mine, but was too hazardous to mine due to cave-ins.

14. Below is a place where a forest fire took place several years ago. Notice how the trees are beginning to grow back. If you will remember, when we had the movie on forest management given by Darrel Harrison, he said that in the early 1900's this whole area was destroyed by fire.

15. **Mouat Mine.** This mine was started in 1950 and ran until about 1960, but was abandoned because of the low ore content. Notice the camp where the mill was.

16. **Limestone.** If the air is not too rough, we may be able to go by this peak. On the place that Bud Dinsdale owned is a good example of erosion brought about by too much water in one place. The whole hillside has started to slip.

17. **Walter Crow's.** Off to the right you can see strip cropping being done on Walter Crow's place. This is done because of the large amount of wind coming off the Stillwater River.

18. **Stockade.** Below you can see dams built for stock water. By building these dams, better grazing management can be carried on.

19. **Reed Point and the Yellowstone River.** Just across the county line farmers are taking part in the River Bank Stabilization program. They are building up the river bank with rocks so that it won't change channels.

20. We are entering the area around Rapelje. All along here you will be able to see the strips for wind erosion conservation. You will also be able to see a number of stock water dams and shelter belts built on the north and west side of the farmsteads.

21. See if you can find the areas where they have built what they call dugouts. These are built for stock water, but they do not have a dam or any inlet for water. The ground is dozed out and the edges sloped so that the stock can walk down to water.

22. **Rapelje Townsite.** This is a location point.

23. **Hailstone Wildlife Refuge.**

24. **Halfbreed Wildlife Refuge.** This area at one time was a proposed irrigation project, the water to come from the dam that the Corps of Engineers has proposed between Big Timber and Livingston. At the present time it is very doubtful because of the high salt content of the soil.

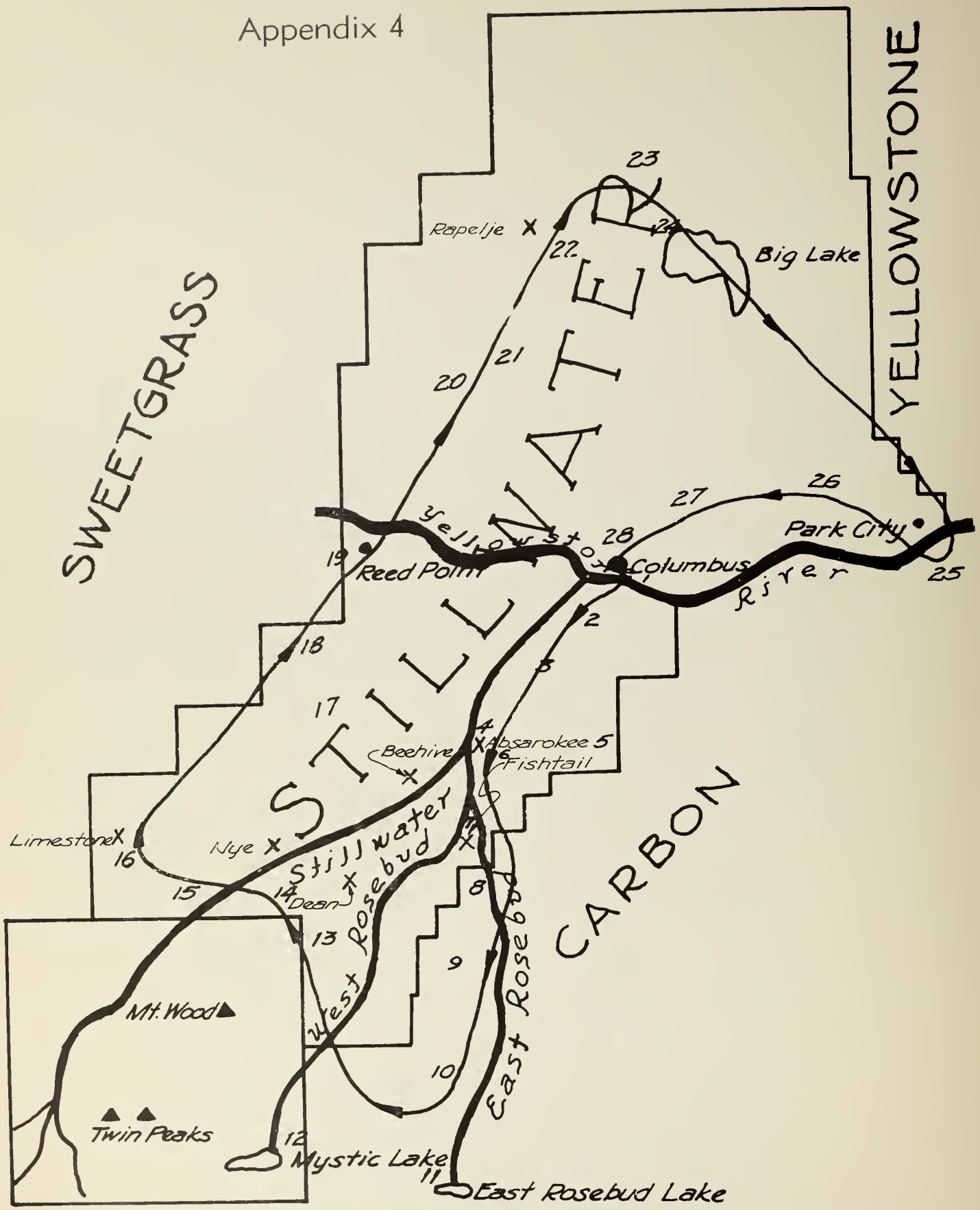
25. **John Burns'.** Notice the shelter belts along each one of the strips. An article was written up about these for the Montana Farmer Stockman farm paper.

26. **Valley Creek.** There is a dam proposed for this area for flood control and recreation. This will be a group participation program. A group of farmers are going together to build this with the help of the U.S.D.A. It will cost about a half million dollars with the government paying about 40-50%. It will cover about two hundred acres and be a little smaller than Cooney Dam.

27. **Ted Keating.** Below they have carried on extensive spring and water development for stock water. On one pasture they have drilled a well that will service five to six sections of land that previously had no water.

28. **Matovich.** Notice along the river they have put in log jetties to keep the river from changing directions.

Appendix 4



- ROUTE MAP -

FOR FURTHER INFORMATION

Regarding

MONTANA'S FLYING CLASSROOMS

Contact

AVIATION EDUCATION SUPERVISOR

c/o

STATE DEPARTMENT OF PUBLIC INSTRUCTION

MITCHELL BUILDING, STATE CAPITOL

HELENA, MONTANA

or

MONTANA AERONAUTICS COMMISSION

P. O. BOX 1698

HELENA, MONTANA